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REVIEW OF ANTECEDENT CONTROL: INNOVATIVE APPROACHES TO BEHAVIORAL SUPPORT, *EDITED BY J. LUISELLI AND M. CAMERON*

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This review identifies antecedent manipulation and the role of establishing operations as primary themes of the book as well as crucial elements in the design of a broadly applicable behavior support technology. The discussion of the book's thematic treatment of these elements highlights the traditional importance of elaborate antecedent interactions within the field of behavior analysis and welcomes researchers' efforts to broaden their credibility and influence through comprehensive and durable applications of behavior support technologies in a variety of natural settings. The reviewers rate the book as representative of the most recent developments and directions within applied behavior support.

DESCRIPTORS: stimulus control, antecedent control, establishing operations, instructional strategies

Ten years ago this book may well have been titled *Stimulus Control: Innovative Approaches to Behavior Analysis*. The choice of the current title indicates a great deal about recent advances in applied behavior analysis. *Antecedent control* is an appropriate opening for the title because the chapters go beyond traditional stimulus control discussions to provide a focus on the direct and interacting effects of establishing operations and preventive redesign of environments. Appropriate recognition and attention are paid to the role of consequences and the variables that affect stimulus control. However, the chapters are far more concerned with the use of an array of behavioral principles to design effective school, work, and community interventions. Antecedent control is about the complex interactions of variables needed to prevent problem behavior and promote adaptive behavior. Limiting the focus to stimulus control would have forced a narrowing of both the behavioral principles and the antecedent clinical interventions that form the heart of the text.

This book also is about "behavior support." This is not simply the reduction of problem behaviors, or the analysis of behavior, but the engineering of environments that result in acquisition of adaptive behavior and engagement in activity patterns consistent with a rich life. Aggression, disruption, self-injury, and property destruction are barriers to many socially desirable outcomes. Work, education, social relationships, and leisure activities, as well as basic health and safety, are affected by dangerous and disruptive problem behaviors. It is hard to build friendships if you bite people. The book addresses the technology of behavior analysis as a means of achieving broad social gains for individuals. This is a book about support for individuals and the use of a pow-

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erful behavioral technology to guide that support.

Interventions designed to reduce the frequency of problem behaviors have been a hallmark of behavior analysis. Luiselli and Cameron extend the conventional focus on behavior reduction, however, by calling for an applied technology that (a) is grounded in sound behavioral principles; (b) produces socially important behavior change that generalizes across contexts, endures across time, and creates positive living and learning opportunities; yet (c) is consistent with the skills, values, and resources of those who implement the interventions. This is a book that challenges the reader both to consider conceptual developments in behavior analysis and to apply those developments to the design, implementation, and evaluation of practical behavioral interventions.

The book is organized around 17 chapters clustered into six sections. The sections introduce the main themes of the book, discuss challenges related to assessment, and then explore the implications of antecedent control for applied interventions. The text ends with a consideration of evolutionary trends in the field of behavior analysis that make antecedent control a timely concern.

The editors have assembled a talented group of behavior analysts to author the chapters. The authors draw from their common experience with individuals who have moderate to severe disabilities or autism. The examples, and much of the supporting research, are with children and adults with more significant disabilities. It is a strength of the text, however, that the vast majority of the messages apply across a much broader population. This is more a text focused on behavior support in school and community contexts than it is a text focused on a specific population.

We found the strengths of the book to lie in the excellent presentations of innovations in the assessment and intervention of problem behaviors. As with most edited volumes, however, the reader is challenged by shifts in focus and tone across chapters. The chapter content appears to be selected to emphasize recent developments rather than integration into a coherent curricular sequence. As such the text is more appropriate for those with a sound behavioral foundation than for readers who are new to the field. We found two central themes to guide the structure of the book: (a) the manipulation of antecedent events to prevent problem behavior and (b) clarification of the complex role of establishing operations as a conceptual and clinical construct influencing behavior analysis.

ANTECEDENT MANIPULATIONS

Behavior is a function of its consequences. However, effective interventions in clinical settings must be more than elegant combinations of consequence-based procedures (Carr et al., 1999). A unifying message across the chapters is the need to identify events that reliably occasion problem behavior and to engineer environments that minimize access to these antecedent events. In many ways, our growing understanding of antecedent events (Smith & Iwata, 1997) is guiding the development of an increasingly sophisticated clinical technology. The design of interventions for problem behavior historically has been driven by careful manipulation of consequent events. With this book a compelling case is made for adding equal attention to the identification and manipulation of antecedent variables. The focus of functional assessment procedures, for example, must include efforts to identify antecedent influences (Miltenberger, chap. 3; Wacker, Berg, Asmus, Harding, & Cooper, chap. 4). Implied from the examples in these chapters is the need to assess behavior in natural settings where these antecedent events can be observed and manipulated.

ESTABLISHING OPERATIONS

Applied behavior analysis owes a significant debt to Jack Michael for reemphasizing the importance of motivation in behavior analysis and behavioral interventions (Michael, 1982, 1988, 1993). His definition of establishing operations provides a compelling conceptual analysis for defining the mechanisms by which antecedent events may affect problem behavior. Of particular value has been Michael's emphasis on the establishing role of aversive antecedents, and the distinction between distal and proximal establishing operations. Efforts continue, however, to operationalize how establishing operations influence assessment and intervention in applied contexts. Seven of the chapters in the text provide a definition for either establishing operations or setting events, and build from their definition to clinical implications. The definitions are consistent in emphasizing that the mechanism by which establishing operations affect behavior is by momentarily altering the reinforcing or punishing value of a consequence. In the majority of the definitions, care also is taken to note that establishing operations may occur simultaneously with a discriminative stimulus (S^D) target behavior, or distal to the S^D target behavior. There remain, however, considerable differences in the implications the authors draw from this conceptual model and the extent to which existing definitions meet the full range of antecedent variables we now consider when designing interventions.

The introductory chapters by Carr, Carlson, Langdon, Magito-McLaughlin, and Yarbrough (chap. 1) and Luiselli (chap. 2) provide an excellent foundation on establishing operations, and define the basic role that establishing operations play in our understanding of problem behavior. Miltenberger (chap. 3) and Wacker et al. (chap. 4) confirm the basic definitions and emphasize that functional assessment efforts must be better targeted to assess the role of establishing operations. Wacker et al. are especially helpful in encouraging the reader to stay focused on the mechanisms involved (e.g., the extent to which antecedent events momentarily alter the value of a consequence). They describe an analysis by Berg et al. (1994) in which the presence of a sibling altered the function of tantrums (from attention maintained to tangibly maintained) for a young child during mealtime. Additional examples of distal establishing operations are provided in which events early in a day altered behavior performed hours later in a different setting. These findings are consistent with a growing body of literature indicating that the results from a formal functional analysis may be influenced by an array of idiosyncratic antecedent variables (Carr, Yarbrough, & Langdon, 1997; Ringdahl & Sellers, 2000).

A central message from these discussions is the need to include functional assessment procedures that provide information (a) about antecedent events and (b) about events that occurred much earlier than the immediate context. The role of indirect assessment procedures (interviews, rating scales) to identify possible establishing operations may be of central value in the design of initial behavior support or the design of more controlled functional analyses.

The importance of establishing operations, however, extends well beyond assessment. Koegel, Carter, and Koegel (chap. 8), Kern and Dunlap (chap. 13), and Kennedy and Meyer (chap. 15) each focus directly on the importance of establishing operations for the design of clinical interventions. Together these chapters provide a clear, if repetitious, documentation of the key features of establishing operations and a strong message that establishing operations should influence procedures for both functional assessment and applied behavior support. What also is clear, however, is that the existing terms and con-

cepts do not meet the full need of applied behavior analysts. There remains, for example, confusion about the role of establishing operations in evoking behavior in the absence of identified S^Ds. The nature of physiological variables as establishing operations is emphasized, but the limits are left unclear. And of greatest interest is the need for integrating our understanding of antecedent events that momentarily alter the effectiveness of consequences to serve as reinforcers or punishers (e.g., establishing operations) with our understanding of changes in antecedent events that alter behavior through mechanisms other than momentarily altering the effectiveness of consequences. A recent discussion by Dougher and Hackbert (2000) addresses the role of establishing operations, cognition, and emotion. Dougher and Hackbert raise an array of issues that were not well articulated when Luiselli and Cameron constructed their text, and will be important additions for extending and clarifying the role of establishing operations in applied behavior analysis.

There is an impressive commitment in the text to emphasizing the importance of establishing operations and to distinguishing between establishing operations and discriminative stimuli (and in some cases setting events). In the next edition, it will be important to extend this theme to include more recent work on concurrent schedules, the matching law (Davison & McCarthy, 1988; Vollmer & Bourret, 2000), and noncontingent reinforcement (Fisher, O'Connor, Kurtz, DeLeon, & Gotjen, 2000; Goh, Iwata, & DeLeon, 2000; Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). There also is a need to settle on how the term *setting events* will be used. In some cases authors refer to setting events and establishing operations as if they are synonymous. In other cases (Kennedy & Meyer, chap. 15), setting events are defined as qualitatively different from establishing operations, and in yet other cases, the implication is that establishing operations are a type of setting event. A challenge exists for applied behavior analysts in that we have an extremely important concept (establishing operation) that does not capture all the complex antecedent interactions that affect behavior and comes with a very cumbersome label. The label is a barrier for many individuals in applied settings, and *setting event* conveys the message more easily. Language is important, and readers of the present text will look forward to more consistency in the next edition.

THE MAIN MESSAGES

Anyone interested in behavior support in applied settings will benefit from this text. The emphasis on preventing problem behaviors through antecedent manipulations is compelling and well articulated across the six organizing sections.

Section 1: Introduction

We found the introductory chapters by Carr et al. (chap. 1) and Luiselli (chap. 2) to be worth the price of the book. Carr et al. challenge the field to build a science of behavior analysis that not only addresses a molecular analysis of individual behaviors but extends our unit of analysis to the molar level of communities, work settings, and schools. The compelling logic is that only if behavior analysts attend to the macro variables that transform behavior change into improved quality of life will our technology be accepted on a broad scale. This theme extends a similar message from community psychologists (Biglan, 1995), yet offers a careful conceptual foundation for linking molecular and molar analyses. We must be able to show that behavior change is linked to broad goals and that behavioral technology can be applied at a scale that meets the current needs of society. Luiselli follows this call to arms with an elegant discussion of the

conceptual structure for the technology needed to address molar outcomes. Many of the major messages introduced later in the book are previewed. Of special note is the theme that behavior support procedures need not only be technically sound (e.g., consistent with the science of human behavior) but also meet the skills, values, and resources of the implementers (contextual fit). In essence, if the design of behavior support is the engineering of environments that produce behavior change, then those environments must support the adaptive behavior of the implementers as well as the adaptive behavior of individuals with problem behavior.

Section 2: Issues of Assessment

Section 2 is comprised of three chapters focused on assessment. Miltenberger (chap. 3) provides an overview of approaches to functional assessment and the importance of obtaining assessment information about antecedent events. Wacker et al. (chap. 4) extend this message with special attention to the use of concurrent stimulus presentations, a procedure particularly suited for antecedent analysis. Vollmer and Van Camp (chap. 5) provide a chapter on experimental designs for documenting functional relationships. This is less a chapter for applied behavior analysts designing behavior support than a discussion of the methods needed to extend a science of behavior analysis. It is a well-written chapter but seems out of place with the companion chapters. Readers familiar with Vollmer's work on noncontingent reinforcement (Vollmer et al., 1993, 1998) may wonder why a text focused on antecedent control does not include a chapter on the effects of (a) using functional assessment to identify controlling consequences, and (b) delivering those consequence events noncontingently (e.g., as antecedents). The book would have benefited from this content more than from a chapter on single-subject methods.

Section 3: Physical and Medical Influences

The third section presents two chapters focused on physical and medical influences, with emphasis on the identification of psychophysiological and psychopharmacological antecedents. Romancyzk and Matthews (chap. 6) outline the utilization of psychophysiology as both a means of assessing antecedent events and as the foundation for an array of intervention strategies. A variety of physiological measures (i.e., heart rate, skin temperature, electrodermal activity) are presented in the context of an operant-respondent model of arousal. The central message is that the physiological experience of an individual at any point in time alters that individual's perception of environmental events and functionally affects the likelihood of behavior. Especially compelling is the model provided to describe how physiological variables may affect responding within concurrent schedules. The discussion leaves the reader wondering, however, how to define the specific mechanisms by which these variables alter behavior patterns. In some cases the physiological manipulations appear to function as establishing operations. But it is unclear how "momentary" the momentary change in consequence effectiveness needs to be. It also is unclear if in some cases the physiological variables do not simply alter perception of subtle S^Ds, and thereby change response patterns. Romanczyk and Matthews provide important information that challenges current conceptual models. They join Travis Thompson and others who are guiding the field toward a more elegant understanding of the interacting variables that must be understood in applied contexts. As accurate, portable, and affordable measures of physiology become available, the information in chapter 6 will serve as a valuable guide for new applied research.

The use of pharmacological interventions

for individuals with developmental disabilities has a complex and varied history. Singh, Ellis, and Axtell (chap. 7) draw from this history and call for an ecobehavioral approach for investigating psychopharmacological effects. The interactive role of drugs on behavior and behavior on drugs is presented in the conceptual context of setting events and steady-state behaviors. Additional discussion of pharmacology as "reciprocal interactions" is intriguing. Here again the theme of interacting variables is at the fore. For applied behavior analysis to meet the needs of clinical settings, our focus must move beyond simple main effects to the complex interactions that characterize behavior in applied settings.

Section 4: Language-Based Approaches

Three chapters are clustered under the heading of language-based approaches. The clustering seems forced, because the chapters are not focused directly on the development of language as a means of reducing problem behavior. The chapters do, however, introduce the key role of teaching new skills as a central element of behavior support. Koegel et al. (chap. 8) provide a view of behavior support based on organizing antecedent variables to promote the development of pivotal skills (e.g., choice making, question asking, turn taking). This analysis fits well with Carr et al.'s molar approach to behavior support and introduces a curricular variable that may dramatically alter education for young children with autism. If ongoing empirical work confirms that certain pivotal skills serve a key role for skill acquisition, the conceptual model offered by Koegel et al. will be a lasting and important contribution.

Sigafoos (chap. 9) introduces the role of choice as an antecedent intervention. The chapter provides a practical introduction to choice making, and care is taken to note that choice may influence problem behaviors by (a) providing access to more rewarding behavior options, (b) allowing avoidance of aversive stimuli, or (c) serving as an establishing operation to reduce the aversive level of demands and tasks (Fisher & Mazur, 1997; Halle, 1995; Peck et al., 1996; Vaughn & Horner, 1995). The chapter is important for applying sound behavioral theory within a clinical framework that emphasizes the key role of the person receiving support (Wehmeyer, Agran, & Hughes, 1998).

The third chapter in the section focuses on correspondence training (Paniagua, chap. 10). This chapter shifts the reader's attention to higher functioning individuals and on the role of teaching self-instruction (intermediate behaviors) as well as formally teaching say–do relationships. The chapter adds useful information, but the reader wishes for a better conceptual context within which to appreciate the messages.

Section 5: Additional Strategies

The largest section of the book contains six chapters that review antecedent intervention approaches. The first two chapters offer different perspectives on the common theme of refocusing the unit of analysis in behavior support. Saunders and Saunders (chap. 11) describe an approach to behavior support designed around "supported routines." The logic builds from Goldiamond's (1974) "constructional approach," and emphasizes the development of competent routines that lead to socially valued outcomes. Within this approach, behavior support efforts emphasize both decrease in undesirable behavior and the development of desirable routines that both the focus individual and support personnel define as socially valued. The approach blends antecedent and consequence interventions in a package that has strong empirical support, and begins to organize an approach for applying behavior analysis on an expanded scale.

Cameron, Maguire, and Maguire (chap. 12) build from the notion of behavioral routines to the concept of *lifeway.* They define *lifeway* as a neutral alternative to *lifestyle.* The central message of the chapter is that "behavior is influenced by the context in which it occurs, and lifeway, rather than being marginalized, should be the focus of the behavioral intervention" (p. 287). We did not find the term *lifeway* to be compelling, but the broad message about expanding assessment prior to the design of support is consistent with the directions of those who advocate person-centered planning as a first step toward effective behavior support (O'Brien, O'Brien, & Mount, 1997; Vandercook, York, & Forest, 1989). Activity patterns, social relationships, and living and working opportunities affect behavior. The variables and clinical examples Cameron et al. describe are consistent with a molar approach to behavior support, and the chapter provides a first step toward blending behavior analysis and person-centered planning. Additional definition of variables and empirical documentation will be needed for the full force of this message to be appreciated.

Three of the chapters in Section 5 address instructional variables. Cuvo and Davis (chap. 16) begin with the compelling premise that among the strongest antecedent interventions available is the instruction of new skills. Behavior support should involve effective instruction on (a) appropriate social behaviors and (b) those skills that make problem behaviors irrelevant. The remainder of the chapter is a clear description of the prompting and reinforcing skills of teachers that are needed to build and transfer stimulus control. To this primer on teaching, Kern and Dunlap (chap. 13) add well-documented procedures for curriculum design. Adapting the curriculum in response to information from a functional assessment is not common in our schools. Kern and Dunlap provide guidelines for using functional assessment outcomes to modify tasks, modify instructional presentation, and alter establishing operations to make academic instruction effective and free from problem behaviors. Prior work by Kern and Dunlap extended functional assessment methods to higher functioning students and demonstrated the power of antecedent curricular modification to produce impressive change in escape-maintained problem behavior (Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Kern, Dunlap, Clarke, & Childs, 1994). This chapter organizes and presents the basic messages from that body of research.

McComas and Progar (chap. 14) focus on instructional procedures for addressing noncompliance. They note that noncompliance is a convenient way of describing lack of stimulus control. They organize desired stimulus control relations into two categories—rule governed and contingency shaped—a model that behavior analysts will recognize and appreciate. The remainder of the chapter, however, extends this analysis into a matrix of intervention options based on the hypothesized failure to achieve desired stimulus control. The result is an interesting thesis for applying functional assessment data to behavior support of noncompliance. The model provides interesting intervention options but at this point begs for empirical testing.

Chapter 15 is a theoretical analysis of establishing operations by Kennedy and Meyer. This chapter provides the most extensive discussion of the role of establishing operations within behavior support. The need to examine motivation is discussed, and the central impact of both distal and proximal establishing operations is described. A model for establishing operations is used to define implications for both functional assessment and clinical intervention. In addition, the authors distinguish between the concept of *setting events,* which they cast as part of an interbehavioral account of human behavior

(Kantor, 1959), and the more operational *establishing operation.* They find the interchangeable use of the terms confusing and inappropriate, and advocate the consistent use of *establishing operation* in behavior support efforts. We found this to be a helpful chapter that may have benefited readers if it had been located earlier in the text. When we used the text as part of a recent advanced doctoral seminar on applied behavior analysis, this chapter prompted some of the better discussions and research proposals.

Section 6: Conclusions

The book ends with Luiselli and Cameron (chap. 17) emphasizing that antecedent control is both a foundation of behavior analysis and a concept that is consistent with the broadening vision for behavior support in applied settings. The increasing attention to empirical assessment of behavior is opening new doors for interventions that include individualized environmental redesign, individualized curricular modifications, individualized instruction, and more personalized attention to reinforcers. The strong point is that potential exists for a strong melding of the values that drive behavior support in applied settings and the technology that makes that support effective. Taking advantage of this opportunity will require careful collaboration between research that maps out complex interacting variables and the day-to-day application of behavior support procedures.

Luiselli and Cameron have captured an important moment in time with this text. The themes that link the chapters are important indicators of how our field is evolving. The gaps and inconsistencies across the chapters are important indicators of where our research and theory remain undeveloped. As we write this review, there are studies and papers being published that address specific issues raised in the book and move us closer to a coherent understanding of antecedent control in behavior support. This is the right direction for our field. We look forward to the next edition.

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